REPORT OF 35TH SARC, WOODS HOLE 24-28 JUNE 2002

Prepared for the University of Miami Independent System for Peer Review

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EXCECUTIVE SUMMARY

The 35th Stock Assessment Review Committee (SARC) convened at the Northeast Fisheries Science Center (NFSC) in Woods Hole on 24-28 June 2002 to review the assessments for summer flounder (*Paralichthys dentatus*) and scup (*Stenotomus chrysops*), and a new method developed for the analysis of trends in abundance and fishing mortality. A relatively small portion of the meeting was devoted to reviewing some recent stock identification work done for silver hake (whiting, *Merluccius bilinearis*). The review panel included representatives of the Mid-Atlantic Council, state fisheries agencies, the Atlantic States Marine Fisheries Commission and the NFSC, and three independent experts, two of them appointed by the Center for Independent Experts (CIE), one of whom chaired the meeting.

The SARC process allowed for an adequate review of the assessments and methods presented. The conclusions and recommendations of the review are well-covered in the SARC consensus and advisory reports, and so only a summary of major findings and recommendations is presented in this report. In addition, general issues about the assessment and management approaches, and the review process are discussed. The latter were not part of the terms of reference for the SARC and reflect the personal views of the author.

1. The assessment of summer flounder indicates that management has been able to markedly reduce fishing mortality from the high rates that occurred in the mid 1990s to levels that are close to F_{max}, the current target. Surveys consistently show that the stock is well in its path to rebuilding. The stock is still overfished given current reference points, and management should continue efforts to maintain fishing mortalities at levels compatible with stock rebuilding. Reference points should be reconsidered when more information about the stock dynamics at large population sizes becomes available. In the mean time, rebuilding management strategies could be developed that do not depend on estimates of reference points associated with maximum sustainable yield (MSY).
2. The assessment of scup is limited by inadequate catch records, which preclude the estimation of absolute stock size and fishing mortality. A marked increase in the survey index of stock abundance in 2001 has led to a determination that the stock is currently not overfished. The stock can likely sustain modest increases in catches, but managers should make their decisions with due consideration of high uncertainty in stock status determination. An additional source of concern is that recreational catches have consistently overshot their targets. Improvements in sampling of discards are recommended in order to improve the assessment. Because a reliable series of catches will take time to build, assessment techniques and management approaches that depend on the surveys and are robust to errors in catch estimates should be designed so that management advice can be more objectively framed than is the case at present.
3. The new assessment methodology developed for the analysis of index data was found useful as an empirical technique for presenting an integrated picture of trends in

fishing mortality and stock responses when only catch statistics and survey trends are available. Strengths and limitations of the methods were identified. It was recommended that the methods be evaluated using stochastic simulations consistent with different exploitation histories, levels of density-dependence and other specific scenarios of interest. Performance should be evaluated both in terms of the estimation of relative fishing mortality for stock replacement, and as a simple interim technique to guide assessment and quota-setting. Results of such simulation studies should be peer reviewed before the methods can be used for assessments.

4. The analysis of stock identification for silver hake was considered preliminary and it was recommended that management agencies continue to apply the currently accepted description of stock structure when considering strategies for the management of this species.
5. Assessment methods used for the two stocks reviewed are limited to stock-production models and VPAs. Other techniques may be better suited to assessing these stocks, given the limitations in data (e.g., incomplete catch records, short series of catch-at-age). Recommendations include the use of statistical models to integrate the different sources of information available for different periods, and analysis of relative trends in abundance and fishing mortality from age-specific indices derived from the surveys.
6. Overfishing guidelines encourage the use of control rules based on biomass and fishing mortality reference points associated with MSY. In the two assessments reviewed, implementation of such rules would be difficult given uncertainties in MSY-related quantities (e.g. summer flounder) or in current levels of fishing mortality and stock abundance (e.g. scup). Other control rules for setting Total Allowable Landings (TALs), not dependent on estimation of fishing mortality, may prove to be more effective at achieving stock rebuilding to some relative target. For example, empirical rules to adjust TALs in response to trends in abundance estimated from the surveys may be considered. Performance of different candidate rules could be explored using simulations tailored to the characteristics of the fisheries in question.
7. Research recommendations from previous SARCs have not been adequately addressed, and there is a considerable overlap between those and the recommendations that resulted from the 35th SARC. A process to determine feasibility of research recommendations, priorities and assignment of research responsibilities is needed. The SARC itself, as author of the recommendations, could play a role in the discussion of priorities.

SCOPE OF REVIEW

The Statement of Work for this review (Appendix 1) involved participating as an independent reviewer in the 35th Stock Assessment Review Committee. The panel was tasked with reviewing the assessments for summer flounder (*Paralichthys dentatus*) and scup (*Stenotomus chrysops*). In addition, the panel reviewed a newly developed methodology to analyze trends in abundance and fishing mortality, and to provide biomass projections based on relative indices of abundance and total catches. A relatively small portion of the meeting was spent reviewing some recent stock identification work done for silver hake (*Merluccius bilinearis*).

DESCRIPTION OF REVIEW ACTIVITIES

The 35th SARC convened at the Northeast Fisheries Science Center (NFSC) in Woods Hole the week of 24 June 2002. The review panel included representatives of the Mid-Atlantic Council, the Atlantic States Marine Fisheries Commission, the state fisheries agencies and the NFSC, and three independent experts, two of whom were appointed by the Center for Independent Experts. As one of the CIE experts, I was provided with background data covering all the themes included in the terms of reference for the meeting (Appendix 1) the week prior to the review. Each of the assessments and methods reviews covered commenced with a detailed presentation of the material by the senior author of the analysis, followed by general discussions between the panel and other meeting participants. On a few occasions, additional analyses were requested from the scientists, their results were examined over the course of the review, and the working papers were adjusted appropriately. A consensus report and advisory recommendations were drafted and revised until contents were agreed upon by all members of the panel.

I believe that the main product of my participation as a CIE expert was reflected in the discussions that took place during the SARC meeting. This report presents a brief summary of the main conclusions, but does not attempt to address details that are fully covered in the SARC reports. The only additional comments and recommendations that I offer refer to issues that were not in the terms of reference for the SARC, and reflect my personal views about the process.

I am thankful for the opportunity to participate in the SARC and appreciate the support provided by Dr. Terrence Smith and other scientists at the Center, which resulted in a productive meeting. Finally, I would like to express my gratitude to Pie Smith for contributing in every way possible to facilitate our work and to make the external participants feel at home.

SUMMARY OF FINDINGS

Summer flounder

Given current definitions of reference points, the stock of summer flounder is technically overfished and overfishing is occurring. However, the assessment indicates that management has been successful at reducing fishing mortality from the high rates that occurred in the mid 1990s to levels that are close to F_{max}, the current target. Surveys consistently show that the stock is well in its path to rebuilding. Relative indices of abundance derived from the synoptic surveys are as high as they have ever been. Rebuilding targets, based on projections made under fishing mortalities equal to F_{max} , are however much higher than current stock size. It is important to note that expected rates of rebuilding are based on increased survival and the resulting expansion of the stock age structure, and not necessarily on increases in recruitment.

Previous reviews have recommended that the use of F_{max} as a proxy for F_{msy} should be reconsidered as more information on the stock dynamics at larger population sizes becomes available. While evaluation of reference points was not in the terms of reference for the SARC, I support these recommendations. Management strategies that do not depend on MSY reference points, but rely more directly on stock trends estimated from the surveys, may work well for this fishery, given the apparent consistency in the indices derived from the synoptic surveys.

Recommendations. Continue efforts to maintain fishing mortality at levels compatible with stock rebuilding. Develop rebuilding management strategies that do not depend on estimates of reference points associated with MSY. Reconsider the choice of reference points when more information on the stock dynamics at larger population sizes becomes available.

Scup

The main limitation for the assessment of scup is the inadequacy of the catch records. This is due to poor sampling of commercial discards, which appear to be substantial. This situation precludes the estimation of absolute stock size and fishing mortality, and the determination of stock status with respect to overfishing. Trends in fishing mortality have been decreasing and a marked increase in the index of stock abundance in 2001 has led to a determination that the stock is currently not overfished. Although the survey data are noisy and show evidence of strong year effects, several of the state surveys are consistent in indicating recent increases in abundance. The stock can likely sustain modest increases in catches, but managers should make their decisions with due consideration of high uncertainty in stock status determination. An additional source of concern is that recreational catches have consistently overshot their targets.

Improvements in sampling of discards are needed if estimates of stock size and fishing mortalities are to be provided. This was a strong recommendation of the SARC. The panel suggested that a working group be tasked to design a sampling plan that adequately represents each component of the catch as a requirement for improving assessments. It should be noted, however, that even in the best-case scenario where an adequate sampling plan is put in place in the immediate future, it will be a while before a series of reliable catch statistics is built and can be used as a basis for an analytical assessment. Assessment techniques and management approaches that depend on the surveys and are robust to errors in catch estimates should be designed so that management advice can be more objectively framed than it is at present.

Recommendations. Improve sampling of discards and implement more effective plans for not exceeding catch quotas. Explore assessment and management techniques that rely on relative survey indices. Reconsider the choice of reference points when improved information on the stock dynamics becomes available.

Silver hake stock identity

The analysis of stock identification for silver hake was considered inadequate, given limitations in the sampling, the data, the fact that a single locus was analyzed, and use of inappropriate statistical techniques.

Recommendations. Management agencies should continue to apply the currently accepted description of stock structure when considering strategies for the management of this species.

Newly developed Index-based methods

The SARC reviewed a working document on the development of a new methodology for stock assessments and population projections based on the analysis of total catch and trends in fishery-independent abundance indices. The basic method consists of analyzing stock trends (the ratio of the current survey index and the average of the five previous indices) as a function of trends in relative fishing mortality (the ratio of total catch and relative stock size). The methods are useful in presenting an integrated picture of trends in fishing mortality and stock responses when only catch statistics and survey trends are available. Also, they can provide a simple technique to be used in interim years between major assessments, to confirm that the stock and fishing mortality trends are on track and to guide management decisions.

Under some conditions, mainly when density dependence is weak, the analytical tools developed can help in the estimation of relative rates of fishing mortality compatible with stock replacement ($relF_{rep}$). Such conditions of weak density dependence may be prevalent in the case of depleted fish stocks, a common situation in the region. When, instead, density dependence is apparent, the performance of the method to estimate $relF_{rep}$ will vary depending on the particular history of exploitation of the fishery in question, and rates of $relF_{rep}$ would not be uniquely defined. This and other factors affecting the

performance of the methods could be analyzed by testing them in simulations representing different fishery scenarios of interest. Results of such simulation studies should be peer reviewed before the methods are used for assessments.

Recommendations. Evaluate the new methods using stochastic simulations consistent with different fishery prototypes. Performance of the methods should be evaluated both in terms of the estimation of relF_{rep} levels, and as a simple interim approach for assessment and quota setting.

General issues about stock assessment methodologies

The methods used for assessing the two stocks reviewed by the SARC belong to two classes: (1) VPA methods, used to analyze periods when catch-at-age data are available; (2) stock-production methods, generally used to expand the time frame of the assessment by incorporating longer series of historical catches and survey data, thus covering larger contrasts in stock abundance and fishing mortality. The use of other classes of methods for integrating all sources of information into a unified statistical analysis may be preferred. The use of forward-projection models for the analysis of catch-at-age may also facilitate dealing with the expansion of the age structures that will occur as the stocks rebuild.

In cases such as scup, where catch records are poor, most fish stock assessment techniques will have serious shortcomings in the estimation of absolute stock size and fishing mortalities. Alternatives for stock assessment and stock projections that rely solely on relative indices obtained from the surveys could still be useful for assessing relative trends in stock size and total mortality. For example, under certain simplifying assumptions about fishing selectivity, age-specific indices of abundance can provide information about trends in year class strength and total mortality.

Recommendation: Consider implementation of other assessment methods that can make better use of the information by integrating all available data into a unified statistical frame. Explore the use of methods that depend solely on age-specific indices of abundance based on the research surveys to analyze relative trends in abundance and fishing mortality.

General issues about management approaches

An important part of the assessments and panel discussions centered around the determination of stock status relative to overfishing definitions. The overfishing guidelines encourage the implementation of control rules defined in terms of fishing thresholds and targets related to MSY. Control rules must describe a plan for pre-agreed management actions as a function of observed variables related to the status of the stock. In the case of the two stocks analyzed, both managed by catch quotas, fishing mortalities and biomass levels associated with MSY are uncertain, given unreliable estimates of total catches and/or lack of contrast in biomass levels during the period covered by the assessments. In addition to the uncertainty about reference points that affects the two

assessments reviewed, data limitations in the case of scup do not allow the estimation of absolute stock size and fishing mortality. In such situations, a generic control rule defined in terms of target and threshold fishing mortalities cannot determine the management actions. This is because it is not possible to link the total allowable landings with the fishing targets. The use of empirical control rules to adjust quotas in response to changes in survey indices of abundance may provide a more effective strategy to achieve stock rebuilding, without requiring the estimation of actual fishing mortalities. This type of management procedures could be evaluated using simulations designed to represent the specific stock in question. Because of the management frame under which assessments are conducted, a great deal of effort is devoted to estimating proxies for MSY-related reference points. In cases where F-based control rules are impractical, effort may be best spent in developing other kinds of control rules that respond more directly to estimated trends in abundance.

Recommendation: Evaluate performance of alternative control rules designed to achieve stock rebuilding. Among these, consider empirical control rules to adjust catch quotas directly in response to changes in relative abundance indices.

General issues about the SARC process

Discussions at the SARC were open, allowing a fruitful exchange of views from all participants. The panel provided a fair level of review of the analyses presented, without attempting to explore alternative methodologies and the degree of robustness of assessment results to changes in methods. Different methodologies had been attempted by the scientists, but the panel made recommendations to further evaluate new approaches.

It was noted that the list of recommendations made by the SARC for the two stock assessments reviewed overlapped considerably with recommendations made by previous SARC panels dealing with the same stocks. The recommendations are very heterogeneous in nature, some involving consideration of new methods, some stressing the need to improve data collection and monitoring, and some simply dealing with presentation of results. These recommendations have of course very different implications in terms of budget and human resources. As an external reviewer, it was not clear to me what it would take to follow the recommendations and whether it was possible to attempt to address the full list with the resources available. Perhaps the SARC should incorporate a process to assure accountability, so that recommendations are not simply stated as a long wish list, but instead consideration is given to the assignment of priorities, distribution of responsibilities, and the development of a plan to follow them.

Recommendation: Design a process to determine feasibility of research recommendations, priorities and assignment of research responsibilities. The SARC itself, as author of the recommendations, could play a role in the discussion of priorities.

APPENDICES

1- STATEMENT OF WORK

June 13, 2002

GENERAL

The Stock Assessment Review Committee meeting (SARC) is a formal, one-week long meeting of stock assessment experts who serve as a peer review panel for several tabled stock assessments. It is part of the overall Northeast Stock Assessment Workshop (SAW) process that also includes peer assessment development (SAW Working Groups), public presentations, and document publication within a cycle that lasts six months. The panel is made up of some 12-15 assessment scientists: 4 scientists from the NEFSC; a scientist from the Northeast Regional office, scientists from the staff of the New England and Mid-Atlantic Fishery Management Councils, and Atlantic States Marine Fisheries Commission and additional panelists from state fisheries agencies, academia (US and Canada), and other federal research institutions (US and Canada).

Designee will serve as reviewer of the 35th Stock Assessment Review Committee panel. The panel will convene at the Northeast Fisheries Science Center in Woods Hole the week of 24 June 2002 (24-28 June) to review assessments for summer flounder (*Paralichthys dentatus*) and scup (*Stenotomus chrysops*). The panel will also review a newly developed methodology used to provide biomass projections for stocks whose assessments are index-based. The SARC will also be asked to review and comment on some recent stock identification work for silver hake (whiting, *Merluccius bilinearis*).

Specific

The reviewer's duties will occupy a maximum of 10 workdays; a day or two prior to the meeting for document review; the week long meeting; and a day or two following the meeting to ensure that the final documents are consistent with the SARC'S recommendations and advice, and a few days to prepare the review report. No consensus opinion between two CIE reviewers will be accepted.

(1) Prior to the meeting: become familiar with the working papers produced by the SAW Working Groups (total number not final; there will be at least one per stock);

(2) During the meeting: participate, as a peer, in panel discussions on assessment validity, results, recommendations, and conclusions. Participate in the formulation of the draft SARC Advisory Report;

(3) Review the final Draft Advisory Report and Consensus Summary Report.

(4) No later than July 15, 2002, submit a written report[1] consisting of the findings, analysis, and conclusions, addressed to the "University of Miami Independent System for Peer Review," and sent to Dr. David Die, via email to ddie@rsmas.miami.edu.

Contact persons: Dr. Terrence P. Smith, NEFSC, Woods Hole, SAW Chairman, 508-495-2230
Mary Jane Smith, NEFSC, Woods Hole, SAW Coordinator, 508-495-2370

Signed_____ Date_____
Ana Parma

[1] The written report will undergo an internal CIE review before it is considered final. After completion, the CIE will create a PDF version of the written report that will be submitted to NMFS and the consultant.

2- LIST OF MATERIALS PROVIDED

Phoel, W.C., J. Lovgren, R. A. Eckhardt, Z. M. G. Sarwar Jahangir, and P. Straub. The Correlation of Silver Hake (*Merluccius bilinearis*) Abundance with Bottom Water Temperatures in the Middle Atlantic Bight and Stock Identification using Microsatellite DNA. A report to the National Marine Fisheries Service.

Rago, P. 2002. Application of index methods: catch and fishery independent abundance survey.

Scup Draft Advisory Report.

Southern Demersal Working Group. 2001. 2001 Summer Flounder Assessment Draft Advisory Document.

35th Northeast SAW . Estimates of fishing mortality (F) and stock biomass of scup from 1981 to 2001 based on CPUE from the recreational private boat fishery.

35th Northeast SAW. Southern Demersal Working Group. Assessment of Summer Flounder for 2002.

35th Northeast SAW. Mid-Atlantic Fishery Management Council Scientific and Statistical Committee (SSC) 2001 Summer Flounder Overfishing Definition Review.

35th Northeast SAW. Scup Working Paper for 2002 Assessment Update.

35th Northeast SAW. Exploratory ASPIC Model Analysis for Assessment of Scup Population.